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PARENDO, KEVIN A				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/582,343

Applicant(s)

ROBERT, PHILIPPE

Examiner

Kevin Parendo

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 October 2008.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10-18 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 10-18 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 09 June 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/5508)
Paper No(s)/Mail Date 6/9/06
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of group 1 (claims 10-14) in the reply filed on 10/16/08 is acknowledged. Since the restriction requirement was made by the examiner, it has come to the examiner's attention that the restriction requirement was made under the statutes regarding U.S. applications, but the present application is a filing under 35 U.S.C. 371, and is a national stage application of PCT/FR2004/003216. Thus, any restriction requirement must be made under the "unity of invention" standards, see MPEP 1893.03(d), and thus the restriction requirement is deemed to be improper and hereby withdrawn. Claims 10-18 are pending and will be examined.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the subject matter of claims 17 and 18 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure

is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The abstract of the disclosure is objected to because it contains the phrase "comprising." The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The phrase should be changed to "including." Correction is required. See MPEP § 608.01(b).

Claim Objections

4. Claim(s) 15 is/are objected to because it/they contain(s) the limitation "according to claim 10" on line 2. This limitation makes the claim ambiguous because it is not known if all of the limitations of claim 10 are included in claim 15, and because of repeated terms "a first layer", "a third layer", etc. that exist in both claims, many limitations lack proper antecedent basis and can create confusion. It is recommended

to delete the limitation "according to claim 10", and if any limitations included in claim 10 are desired in claim 15, to amend them into claim 15 as appropriate.

5. Claim(s) 10-18 is/are objected to because it/they contain(s) the limitations "Microcomponent" or "method" at the beginning of each claim, which need to be preceded by the word "a" or "the", as appropriate. Further, claims 10 and 15 contain other instances of this, such as line 3 of claim 10 and line 11 of claim 15.

6. Claim(s) 10 is/are objected to because it/they contain(s) the limitations "the direction" on line 9 that should be amended to "a direction".

7. Claim(s) 12 is/are objected to because it/they contain(s) the limitations "the highest part" on line 2 that should be amended to "a highest part".

8. Claim(s) 15 is/are objected to because it/they contain(s) the limitations "the direction" on line 22 that should be amended to "a direction".

9. Claim(s) 17 is/are objected to because it/they contain(s) the limitation "formed by", wherein the word "by" is intended to mean "as", not "near". To makes this clearer, it is recommended to amend the limitation to "formed as".

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 15-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 15 recites the limitation "successfully comprising" on line 2, the limitation "deposition of a second layer, so as to make the microcavity hermetic, method comprising" on lines 10-11, and the limitation "the method comprising" on line 20. The metes and bounds of the claimed limitation can not be determined for the following reasons:

- "Successive" is defined by Merriam Webster's online dictionary as "following in order; following each other without interruption". Thus, it is unclear what "successively comprising" means. It could mean that the steps claimed are in the order as claimed, but other steps could be before, after, or in between the claimed steps. It could also mean that the steps claimed are performed in the order as claimed "without interruption" by any other steps, but the overall method could involve additional steps before the first claimed step or after the last claimed step.
- The limitation "deposition of a second layer, so as to make the microcavity hermetic, method comprising" appears to involve a missing carriage return and indentation, so that "method comprising" should begin a new limitation.

Since the claim already is already [successively] "comprising" limitations, the limitation "method comprising" leads to a lack of clarity as to which limitations are "sequential", and if the limitations after "method comprising" are intended to be steps that the method "further comprises".

- The limitation "the method comprising" further appears to be missing a carriage return and indentation. Since the claim already is already [successively] "comprising" limitations, the limitation "the method comprising" leads to a lack of clarity as to which limitations are "sequential", and if the limitations after "method comprising" are intended to be steps that the method "further comprises".

Claims 16-18 depend on claim 15, and inherit its deficiencies, and are thus also rejected under 35 U.S.C. 112 for the above described reasons.

In light of the aforementioned rejections of the claim(s) under 35 U.S.C. 112, second paragraph, the subsequent rejections under 35 U.S.C. 102 and/or 103 are based on prior art that reads on the interpretation of the claim language of the instant application as best understood by the examiner.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 10-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer (DE 10005555 A1).

Re claim 10, Fischer discloses (see examiner-provided machine-translated English version, page 2) a microcomponent comprising a hermetically-sealed microcavity (cavity **6**, see Fig. 1e, and area where **8** is removed, see evolution from Fig. 1e to 1f) delineated by a cover comprising a first layer **10** (Fig. 1c), in which at least one hole **11** (Fig. 1c) is formed, and a second layer **17** (Fig. 1g) making the microcavity hermetic, the microcomponent comprising

- a third layer **14** (Fig. 1e) arranged between the first and second layer,
- an additional microcavity (areas where **12** is removed, see evolution from Fig. 1e to 1f), communicating with the hole (they are connected) and arranged between the first and third layer, and
- at least one additional hole **15** (Fig. 1e), adjacent to the additional microcavity, formed in the third layer, offset with respect to the hole and sealed by the second layer.

Re claim 10, Fischer does not disclose explicitly that the microcomponent comprises at least one mechanically tensile-stressed layer arranged above the first layer, said mechanically tensile-stressed layer flexing in the direction of the first layer and reducing space to be sealed by the second layer. However, Fischer discloses that layer **10** is intrinsically mechanically tensile-stressed (see column 3, lines 32-34, "Die untere Deckschicht **10** steht idealerweise unter intrinsischer Zugspannung, die durch

geeignete Temperaturbehandlung eingestellt werden kann", which the examiner—provided English translation is given in the middle of page 2 as "The lower top layer **10** stands ideal-proves bottom intrinsic tension, which can become adjusted by suitable temperature treatment". This obviously is a literal translation that has a few words out of context, and the examiner's best translation of this phrase is "the lower top layer **10** stands ideally under intrinsic tension that can be adjusted through suitable temperature treatment"), and since layer **14** is a thin layer just above layer **10**, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the layer **10** would flex towards the substrate given its tensile stress and its convex shape, and that layers above it such as **14** would thus flex in the direction of **10**, and given the holes in layers **10** and **14**, such flexing would reduce the space to be sealed by the second layer by narrowing the holes.

Re claim 11, Fischer further discloses that the additional microcavity communicates with the additional hole (they are connected, see Fig. 1f).

Re claim 12, Fischer further discloses that the hole is arranged on the highest part of the microcavity (see Fig. 1c, where it is on the topmost portion of the cavity).

Re claim 13, Fischer further discloses that the offset between the hole and the additional hole is such that the additional hole does not cover the hole, even partially (see Fig. 1e, where the additional holes **15** are formed so that they do not line up with holes **11**, see Fig. 1c).

Re claim 14, Fischer further discloses that two additional holes **13** (see Fig. 1d) are associated with each hole **11** so that a suspended bridge **12** (Fig. 1d), formed in the third layer and delineated by the two additional holes, covers the hole.

Re claim 15, Fischer further discloses a method for production of a hermetically-sealed microcavity of a microcomponent according to claim 10 (see discussion above for the structure implied by claim 10), successively comprising

- deposition of a sacrificial layer **8** (Fig. 1b) on a substrate **1** (Fig. 1a),
- deposition of a first layer **10** (Fig. 1c) forming a cover, on the substrate and sacrificial layer,
- etching, in the first layer, of at least one hole **11** (Fig. 1c) opening out onto the sacrificial layer,
- removal of the sacrificial layer (Fig. 1f) , via the hole, so as to create a microcavity (cavity **6**, see Fig. 1e, and area where **8** is removed, see evolution from Fig. 1e to 1f),
- deposition of a second layer **17** (Fig. 1g), so as to make the microcavity hermetic,
- method comprising, after etching of the hole and before removal of the sacrificial layer, deposition of an additional sacrificial layer **12** (Fig. 1d) covering the hole and a part of the first layer, over the periphery of the hole,
- deposition of a third layer **14** (Fig. 1e) on the first layer and the additional sacrificial layer,

- etching of at least one additional hole **15** (Fig. 1e), in the third layer, offset with respect to the hole (see Fig. 1e, where the additional holes **15** are formed so that they do not line up with holes **11**, see Fig. 1c) and opening out onto the additional sacrificial layer,
- removal (Fig. 1f) of the sacrificial layer and of the additional sacrificial layer being performed through the additional hole so as to create the microcavity, and
- deposition of the second layer (Fig. 1g) being performed on the third layer so as to seal the additional hole.

Re claim 15, Fischer does not disclose explicitly deposition of at least one mechanically tensile-stressed layer, after deposition of the first layer, said mechanically tensile-stressed layer flexing in the direction of the first layer and reducing space to be sealed by the second layer. However, Fischer discloses that layer **10** is intrinsically mechanically tensile-stressed (see column 3, lines 32-34, "Die untere Deckschicht **10** steht idealerweise unter intrinsischer Zugspannung, die durch geeignete Temperaturbehandlung eingestellt werden kann", which the examiner-provided English translation is given in the middle of page 2 as "The lower top layer **10** stands ideal-proves bottom intrinsic tension, which can become adjusted by suitable temperature treatment". This obviously is a literal translation that has a few words out of context, and the examiner's best translation of this phrase is "the lower top layer **10** stands ideally under intrinsic tension that can be adjusted through suitable temperature treatment"). Fischer also discloses depositing layer **14** after forming layer **10**, and since

layer **14** is a thin layer just above layer **10**, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the layer **10** would flex towards the substrate given its tensile stress and its convex shape, and that layers above it such as **14** would thus flex in the direction of **10**, and given the holes in layers **10** and **14**, such flexing would reduce the space to be sealed by the second layer by narrowing the holes.

Re claim 16, Fischer fails to explicitly disclose that the third layer is mechanically tensile-stressed so that the part of the third layer released by removal of the additional sacrificial layer flexes in the direction of the first layer. However, Fischer discloses supporting layers **10** and **14** by sacrificial layer **8** (see Fig. 1e), and removing layer **8** and thus its support (see Fig. 1f). It would have been obvious to one of ordinary skill in the art at the time of invention that the removal of the sacrificial layer **8** and its upward force on layers **10** and **14** would result in layers **10** and **14** flexing downward, and that layer **14** having holes therein would flex toward the direction of the first layer.

12. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer, as applied to claim 15, above, and further in view of Wang et al. (US 6,667,189 B1, hereinafter "Wang").

Re claim 17, Fischer discloses the limitations of claim 15, as discussed above, but fails to further disclose that the third layer is formed by a first mechanically tensile-stressed sub-layer covered by a second mechanically compressive- stressed sub-layer, the second sub-layer being removed after the sacrificial layers have been removed.

Wang discloses forming a compressive sub-layer **60/62** (Fig. 12) over a sub-layer **58**, and that after removing the sacrificial layer **40** (evolution from Fig. 18 to 19), the compressive layer pulls up on the first sub-layer **58**, and that the compressive sub-layer **60/62** is subsequently removed (see column 7, lines 22-45 and Fig. 20). It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the invention of Wang to the invention of Fischer, so that the third layer is formed by a first mechanically tensile-stressed sub-layer covered by a second mechanically compressive- stressed sub-layer, the second sub-layer being removed after the sacrificial layers have been removed. The motivation to do so is that the combination produces the predictable results of providing a compressive layer over the tensile-stressed layer of Fischer, so that when the sacrificial layer is removed, the compressive layer pulls the layers away from the substrate, which is beneficial because it can counter stiction (column 7, lines 24-27) forces during subsequent steps, and the compressive sub-layer can be ultimately removed to allow the first sub-layer to flex downward.

13. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer, as applied to claim 15, above, and further in view of Ouellet et al. (US 2003/0217915 A1, hereinafter "Ouellet").

Re claim 18, Fischer discloses the limitations of claim 15, as discussed above, but fails to further disclose that after the sacrificial layers have been removed, a mechanically tensile-stressed fourth layer is deposited on the third layer, so that the

third and fourth layers flex in the direction of the first layer. Ouellet discloses a mechanically tensile-stressed outermost layer is deposited on an encapsulated structure (paragraph 146). It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the invention of Ouellet to the invention of Fischer, so that after the sacrificial layers have been removed, a mechanically tensile-stressed fourth layer is deposited on the third layer, so that the third and fourth layers flex in the direction of the first layer. The motivation to do so is that the combination produces the predictable results of providing sealing and stiffening, via deposition of a TiN film having tensile stress, which improves in the rigidity of the underlying encapsulated structure (paragraph 146).

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Parendo, whose can be contacted by phone at (571) 270-5030 or directly by fax at (571) 270-6030. The examiner can normally be reached on Mon.-Thurs. and alternate Fridays from 7 a.m. - 4:30 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached on (571) 272-1907. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kevin A. Parendo/
Examiner, Art Unit 2823
3/11/2009

/Hsien-ming Lee/
Primary Examiner, Art Unit 2823